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(54) **Self-service passenger ticketing system.**

(57) A system is disclosed for issuing airline tickets without the intervention of any ticket agent. The system includes a plurality of electro-mechanical ticket terminals (10) in communication with a central computer. Each of the terminals has a card reader (35), a modem (31 and 31A), destination select buttons (37), and a printer (34). In operation, the card reader reads data from a magnetic strip (15) on a ticket purchasers credit card (12) and the modem transmits signals identifying this credit card to the central computer. Subsequently, the modem receives signals from the central computer indicating good or bad credit. The push buttons are provided on the terminal to enable the purchaser to manually select his destination; and the printer prints a ticket to the selected destination conditional on the credit check signals received from the modem.

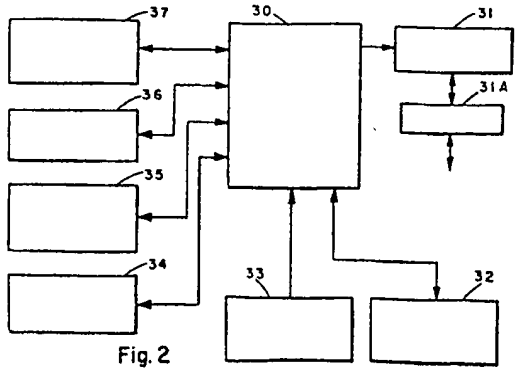

Fig. 2

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SELF SERVICE PASSENGER TICKETING SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to methods and systems for issuing airline ticket to passengers. In the past, such ticket issuing always required the intervention of a ticket agent. One problem with this prior art system, however, is that it is simply too slow. Consequently, long lines of persons waiting for their ticket are a common sight in any airline terminal.

The above problem is overcome in the disclosed invention through the use of sophisticated electronic technology. This technology is combined to form a fully automated passenger ticketing system. No intervention by a ticket agent is required. As a result, ticket issuing bottlenecks are eliminated. The total time required to issue one ticket is less than 10 seconds.

Further, the system is easy to use and can be operated by all passengers. In the preferred embodiment the terminal has a visual display that directs each passenger through a sequence of steps to obtain his ticket. Also in the preferred embodiment, various checks are made based on information received from the travelers credit card prior to the issuance of a ticket. These checks allow only certain types of credit cards to be accepted, for example.

Therefore, it is one object of the invention to provide an improved passenger ticketing system.

Another object of the invention is to provide a passenger ticketing system that is fully automated.

SUMMARY OF THE INVENTION

These and other objects are accomplished in accordance with the invention by a system that includes a plurality of electro-mechanical ticket terminals in communication with a central computer. Each of the ticket terminals includes a credit card reader, a modem, a plurality of destination selection push buttons, and a printer. In operation, the ticket purchaser manually slides his credit card through the card reader. In response, the terminal transmits electronic signals via the modem to the central computer. There, the credit check is made and signals indicatingtthe results of the check are transmitted back to the terminal. Simultaneously while this occurring, the purchaser is directed via a visual display to manually select a destination by means of the push buttons. Also, he is directed to select either a round trip ticket or a one way ticket. Then, dependent on whether the central computer reports the purchasers credit as being good, the terminal calculates the fare and prints the ticket.

BRIEF DESCRIPTION OF THE DRAWING

Preferred embodiments of the invention will best be understood by referring to the following detailed description when read in conjunction of the accompanying drawings wherein;

Figure 1 is a pictorial view of the disclosed ticket terminal in operation.

Figure 2 is a block diagram of the electronics within the terminal of Figure 1.

Figure 3 is a flow chart of the major functions that are performed by the electronics of Figure 2.

Figure 4 is a detailed block diagram of the central control unit in Figure 2.

Figure 5 is a detailed block diagram of the modem controller of Figure 2.

Figure 6 is a detailed block diagram of the printer module of Figure 2.

DETAILED DESCRIPTION

Referring now to Figure 1, a system for issuing airline tickets without the intervention of any ticket agent will be described in detail. The system includes a plurality of electro-mechanical ticket terminals, one of which is indicated via reference numeral 10. These terminals are placed at locations that are convenient to potential ticket purchasers. To obtain a ticket, a purchaser 11 first slides his credit card 12 through a card reader 13. Reader 13 includes a slot 14 for guiding card 12 past the read heads. Various information is read from a magnetic strip 15 on the card as it passes through the reader.

After this information is read from strip 15, the electronics within terminal 10 transmits signals that identify the credit card to a central computer. There, a credit check is performed on the card. Subsequently, terminal 10 receives signals from the central computer indicating whether the credit is good or bad. Based on this information, and on other checks which terminal 10 performs, a ticket either will or will not be issued. This checking sequence and the hardware for performing it will be described in greater detail in conjunction with the Figures 2 through 6.

As the above checks are being performed, passenger 11 selects a particular destination. A total of twenty-four destination buttons 16 are provided for this purpose. Each of the buttons 16 has a particular destination associated with it; and a destination is selected simply by depressing the corresponding button. Subsequently passenger 11 selects either a one way ticket or a round trip ticket. A pair of buttons 17 are provided for this purpose. Also, another push button 18 is provided which is marked "CANCEL". It allows the ticket purchaser to abort any ticket selection sequence and begin a new one.

Terminal 10 further includes three indicators 19a, 19b, and 19c which direct the ticket purchaser through the ticket selection sequence. In Figure 1, indicator 19a is illustrated as being turned on. It directs purchaser 11 to perform step number 1. Indicators 19b and 19c respectively direct the purchaser to perform steps 2 and 3.

Terminal 10 also operates to give purchaser 11 additional messages via a visual display 20. These messages include "wait for ticket" and "see ticket agent". The former message is given when each of the three manual steps is performed correctly and no reason for not issuing credit to the passenger is detected by the terminal. In that case, the actual ticket is dispensed through a slot 21. Conversely, the latter message is given when some reason for not issuing credit to the purchaser is detected by the terminal.

A block diagram of the electronics in terminal 10 will now be described in conjunction with Figure 2. As therein illustrated, these electronics includes a central control unit 30 which is in communication with and controls various special purpose modules 31 through 37. Control unit 30 provides all of the intelligence in the terminal. That is, modules 31 through 37 simply respond to commands from the central control unit.

Module 31 is a modem controller. It operates to provide a communication link between control unit 30 and the central computer through a modem 31a. Basically, in response to commands from control unit 30, module 31 sends messages to the central computer requesting a credit check on a particular credit card, and sends signals indicating the results of the check to unit 30.

Module 32 is a magnetic tape cassette recorder. It provides the means whereby control unit 31 stores a permanent record of each of the ticket dispensing transactions that are made. The cassette itself is removable from the ticket terminal. This allows various off line bookkeeping operations to be performed on the store data.

Module 33 includes a plurality of terminal identification switches. The setting of these switches uniquely define each terminal. For example, these switch settings indicates the city in which the terminal is located, the terminal location, and the terminal number.

Module 34 is a printer and ticket dispenser. Basically, it responds to commands from control unit 30 to print and dispense the airline tickets. These commands direct the printing on a character by character basis.

Module 35 is the credit card reader. The previously described manually operated slide through read mechanism 13 is part of this module. Basically, the module operates to sense any data recorded on magnetic strip 15 and to convert this data to logical signals for control unit 30 to sense and interpret.

The remaining modules 36 and 37 respectively are a timer module and a light/push button module. Timer module 36 operates to provide the hour, day, month, and year to control unit 30. This information is used, for example, to determine whether or not the credit card has expired. In comparison, module 37 provides an interface to the lights and switches on the terminal which were previously described in conjunction with Figure 1. Basically, the module forms a 6 bit code that indicates which of the switches has been depressed; and it responds to a 6 bit code from the control unit to illuminate various ones of the lights.

As was mentioned above, all of the intelligence in terminal 10 is included in the central control unit 30. This intelligence is indicated by the flow chart of Figure 3. First, control unit 30 initializes itself. This operation includes the resetting of various registers that are internal to the control unit; and also includes the reading of the information contained in the switches of module 33. Subsequently, control unit 30 illuminates light 19a. This indicates that the terminal is ready for a credit card to be passed through the card reader. Then the control unit waits for a signal from card reader module 35 indicating that a credit card has been read.

Upon the detection of a credit card, control unit 30 sends a command to timer module 36 which starts a ten second timer. This timer is set to prevent "silent deaths". If the ticket selection sequence is completed within ten seconds, then the timer will be reset by the control unit; otherwise the timer will signal the control unit to terminate the ticket selection sequence.

Next, control unit 30 illuminates light 19b. This indicates that a destination should be selected. Then, the control unit makes various status checks on the credit card that was read. These include a parity check, a check on the type of card, a check as to whether the card has expired, and a check on the number of transactions made at this terminal with the card. A parity error may be caused by a variety of things such as a ticket purchaser inserting his credit card upside down in the card reader for example. In the event of such an error, control unit 30 displays a message in display 20 and returns to point "A" in the flow chart.

If no parity error occurs, then the card type check is performed,, Each credit card has digits recorded on its magnetic strip that identify the card type. For example, the digits 37 identify an American Express card. These card type digits are compared with a predetermined list that is stored within the control unit 30. By this means, the ticket terminal is able to selectively accept or reject particular card types. Also recorded on each credit card is a set of numbers identifying when the card expires. These numbers are compared by control unit 30 against the present date as received from timer module 36. By this means, expired credit cards are rejected without interrogating the central computer.

The number of transactions check operates to limit the maximum number of tickets that can be ontained from a ticket terminal at one time. For each ticket that the terminal issues, it stores the corresponding credit card number. Subsequently, when another ticket is requested, the list of previously used credit cards is interrogated. And if this list shows that five tickets were already obtained by that credit card, than a message "see ticket agent" is displayed via display 20, and control unit 30 returns to point A.

When all of the status checks are passed, control unit 30 directs modem controller 31 to send a message to the central processor. This message identifies of the credit card which is presently being operated on. Upon receipt of this message, the central processor performs various checks to determine whether the card holders credit is good or bad. It then sends signals indicating this determination back to modem controller 31.

This response from the central processor is interrogated by control unit 30. If the response indicates the card holder has bad credit, then the ticket selection process terminates. Conversely, if a good credit status is indicated, then control unit 30 monitors module 37 until a destination has been selected. When that occurs, the control module illuminates light 19c, which indicates that a one way or round trip ticket should be selected. After that selection is made, control unit 30 uses the destination select information and the round trip/one way information to calculate the fare. Pricing data to each of the various destinations is stored in a programmable ROM within the control unit.

Subsequently, control unit 30 directs printer module 34 to print a ticket. Also, the control unit directs the cassette recorder 32 to record on the cassette, all of the information that was printed on the ticket. This includes the date, destination, fare, ticket number, and credit card number.

All of the functions in Figure 3 are initiated and controlled by control unit 30. A detailed block diagram of this control unit will now be described in conjunction with Figure 4. Basically, the control unit is comprised of a micro-processor chip 50, a plurality of output ports 51 through 56, and a plurality of input ports 61 through 66. The output ports provide a means for micro-processor 50 to send commands to each of the previously described modules 31 through 37. Similarly, the input ports 61 through 66 provide a means for receiving information signals from modules 31 through 37. Figure 4 illustrates which ports connect to which modules.

Communication between processor 50 and the various ports is provided by means of an address bus 50a, a data bus 50b, and a control bus 50c. In one preferred embodiment, the address bus is sixteen bits wide, the data bus is eight bits wide, and the control bus is one bit wide. This embodiment may suitably be implemented with processor 50 being an 8080 type micro-processor.

Address bus 50a in conjunction with the control bus 50c provide the means for selecting each of the ports. To this end, address 50a is decoded by an address decoder 70. This decoder has various outputs 71, each of which connects to one input port and one output port. Selection

between an input port or an output port is made by signals on control bus 50c. For example, suppose the signals on address bus 50a are such that decoder 70 generates a select signal on lead 71a. Under these conditions, a high logic state of control bus 50c operates to select output port 51, whereas a low logic state of control bus 50c operates to select input port 61.

Data bus 50b is used to transmit data to the output ports and receive data from the input ports. This is achieved by constructing each of the output ports as a triggerable register, and by constructing each of the input ports as a register with logically selectable output. Preferably, both the input ports and the output ports are comprised of INTEL 8212 chips.

Also included in control unit 30 is a RAM 72 and a ROM 73. Basically, the RAM is used as a work area for micro-processor 50. In the preferred embodiment, it has a capacity of 512 bytes. By comparison, ROM 73 holds instructions for the micro-processor. These instructions are executed by micro-processor 50 in various sequences to carry out all of the functions that were previously described in conjunction with Figure 3. A listing of the instructions in ROM 73 is included herein as Table 1.

A portion of ROM 73 also stores various data which micro-processor 50 can interrogate as needed. For example, data includes pricing information to the various destinations. Preferably, the ROM chips that hold this data are packaged on a separate card or in socket holders which allow them to be easily changed.

Referring now to Figure 5, a detailed block diagram of modem module 31 will be described. This module includes an interface 80 which meets RS232 standards. Receivers 81a are provided for receiving signals from the RS232 interface and for converting them to T^2L logic levels. Similarly, transmitters 81b are provided for converting T^2L signals to RS232 levels. The actual modem to which this interface connects is a VADIC full duplex model 2430.

In operation, the central processor sequentially polls each ticket terminals to determine whether or not that terminal has a credit card to be checked. All messages that are received from interface 80 are first stored in a message storage RAM 82. Subsequently, after the message is received, it is sent to a message compare circuit 33. This circuit has a second input from a ROM 84. This ROM contains the format of various messages which the terminal is to recognize.

If the message in RAM 82 is determined by compare circuit 83 to be a poll message, then a signal indicating this fact is sent via a lead 85 to a timing and control circuit 86. In response, control circuit 86 sends a message back to the central processor. The exact message sent depends on whether or not the modem had previously received from control unit 30, the number of a credit card to be checked. This number is stored in a RAM 87 by means of signals from output port 56.

If RAM 87 has a credit card number stored therein, then this number is sent through a multiplexor 88 and through transmitters 81b to the remote processor. Conversely, if RAM 87 has no credit card number stored therein, then a canned message is read from ROM 89 and sent through multi-

plexor 88 and transmitters 81b, to the central processor. Timing signals for these transmissions are generated by control circuit 86 on leads 90.

When the central processor receives a credit card number to be checked, it responds with a message on interface 80. Again, this message is stored in the message RAM 82. Subsequently, the message in RAM 82 is sent to compare circuit 83 for comparison with the messages in ROM 84. This time, the received message will indicate either a good credit status or a bad credit status. Circuit 83 operates to generate signals on leads 91 indicating which message was received. These messages are subsequently interrogated through inport port 60 by microprocessor 50.

Referring now to Figure 6, details of the printer control module will be described. Basically, this module consists only of output port 54 and input port 64. Signals from output port 54 includes 7 hammer select signals 100, a head motor control signal 101, and a ticket advance signal 102. Similarly, signals to input port 64 consists of two end position sense signals 103. These signals are sent to/received from a Practical Automation printer having model number DMPT-6.

In operation, control unit 30 first monitors the end position signals to determine if the print head is in a position where printing can begin. One of the end position signals indicates that the print head is in an extreme left position and thus printing can begin from left to right; whereas the other signal indicates that the print head is in an extreme right position and printing can begin from right to left. Upon detection of one of the signals, the head motor control signal is sent. This causes the print head to move in a lateral direction in a predetermined speed.

Subsequently, in synchronization with this speed, various hammer select signals are sent to the printer. To print one character, these signals are held true for 600 milliseconds, and are turned off for 1000 milliseconds. All of this timing and signal selection is accounted for by the microprocessor 80.

The above described character by character printing continues until one full line is printed. Subsequently, the ticket advance signal is sent to the printer. In response, the ticket is moved to a new line. Then printing of that new line continues as described above. A total of four lines are printed on each ticket.

Card reader module 35, timer module 36, and tape cassette module 32 also have standardized interfaces similar to that described above for the printer. Their control is implemented by sending signals to and receiving signals from the corresponding output and input ports. The actual card reader used in terminal 10 is the model 40 magnetic strip card reader that is manufactured by American Magnetics Corporation. Similarly, the actual timer that is used in terminal 10 includes a semiconductor chip number 5880N that is manufactured by NSC Corporation. This chip gives the seconds, minutes, hours, and months. The year is set in by hand via several switches. And, the actual tape cassette that is used in terminal 10 is a model 250B with option 214 that is manufactured by MFE Corporation. Further, details on the interface to each of these components is available from their respective manufacturers.

A preferred embodiment of the invention has now been described in detail. In addition, various changes and modifications may be made thereto without departing from the nature and spirit of the invention. Therefore, it is to be understood that the invention is not limited to said details but is defined by the appended claims.

TABLE 1

Address Data

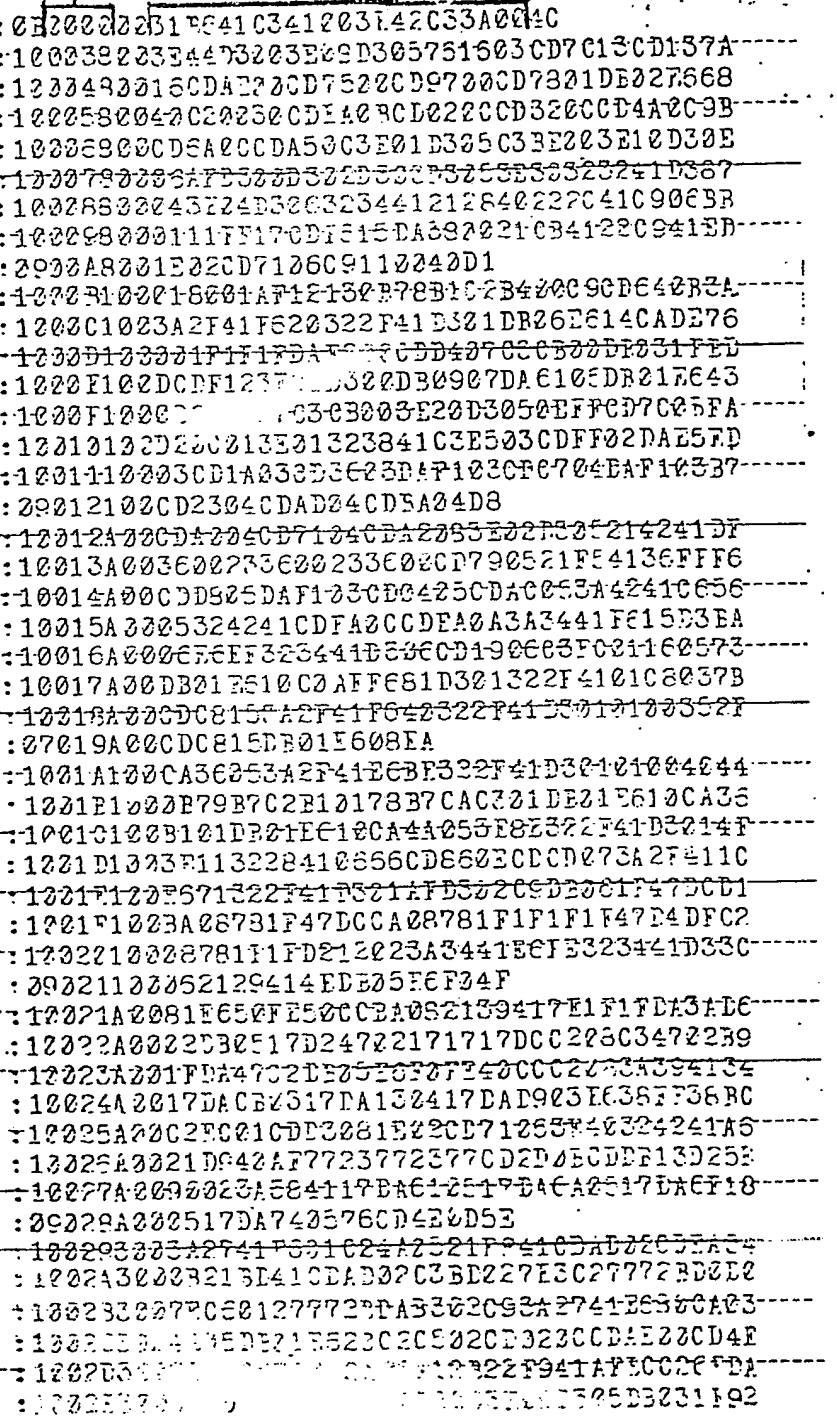

TABLE 1 Continued

Address Data

```
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:080323003CE21003233DFEF86B
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:10032B000C720031A1F1F1FE61F77C916002122E4270
:10033B007EFE0BC24D023237EFE04DA8003FE06DA33
:10034B00257003A3041F8048C28415709257E09DAEC
:10035B006003C34D02307EFE02C27C03237FFE02BE
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:1003B200C24D23237EFE05C24D031E01AFC923239E
:1003C2007EFE05C24D03C360031E44021C941060C
:1003D2002ACD5115CDC607CDAE00CD7500CDD308BF
:1003E200C36E005A3B413C03B41FE03DA0504CD89
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:10041B0003234410E05C3CB0321F9417EFE0F4723C8
:10042B0000E047EE60F802747230DC22D042B0E05ED
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:09246B00320632BA40C911C44145
:10047400215840103707070727F5CD8A04F1250707
:10048400073 7CD3A04C9E60FFE0ADA9704C692747
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:1004B40000377EC7400C6C911B24021E941C327ECDC0
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:1004D4007E070907090E5F023A34F237EC707090703
:2004E400E5F023AB4721C1415EA0
:1004ED0022323560D9615D2F924D1AFC93A3941FC2A
:1004FD00083238 41D137C911C94121E4 40062CCD0C
:10050D00511521C9415FE0 1 53A35412EEPFEFF2FFF
:10051D00023E0 0EB031A77231305C2F1053FFEBDC249
:10052D0032252 1C3412209410915CA44053A2F416D
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:10054D00023AFF41FE6032FF41D3013EE0B32431 35
:08055D0028D325763EC0D300EF
:100565 0027257 CB0 E0CC3C3053 3C6C0C5C3 03 0D2
:100575 02620C3C3251 12E4021 6A4 01AEC2FFF0ADAEZ
:100585005D25C6922 27C53027FE0CC2940 53E0A791A
:10059500 3A4241 3C32424 1201B1AE60FFE0F131329
:1005A500C27F05724341C0 921C4402353 7F 33C53F2E9D
:1005B5003AC641772336102A4341361D2323233673
:1005C5002 05 F2 0 35 F2 3 0 5 F23 C5 07 21 A5 42 7 6 512509
:2925D5 03641 0 2 1 05 41 5 2 3 2 66 F
```

TABLE 1 Continued

TABLE 1 Continued

Address   Data

```
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:1008EE00DA7C091717DABE0917DAA90917DA390992
:1008FE0036201F00D5CDD70AD1CD990A7EFE41C233
:10090E0019093A3941F603239410C93A3941F6026C
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:100925003229413E74E3053E04D3053A4041323F33
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:100AD000372A0E20C3372A0E0321501719E3B1AAE5
:100AE000401A77132305C2E10AC92158421E0736A0
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:090B000023CD1E0BC3F20A1E0727
```

TABLE 1 Cont'd.

Data

Address

```
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:100C80000000E1C9E53A3241E67F323241D3042126
:100C90002843DB0432444111C4410E01CDDB0C00FA
:100CA000000000E1C9E53A3241E67F323241D30427
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:100CD0003A3241F680323241D304C91A4707070736
:090CE00007E60F772378E60F7791
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:100CF900C9116640CD3F0D6913F5CD3F0DF1790659
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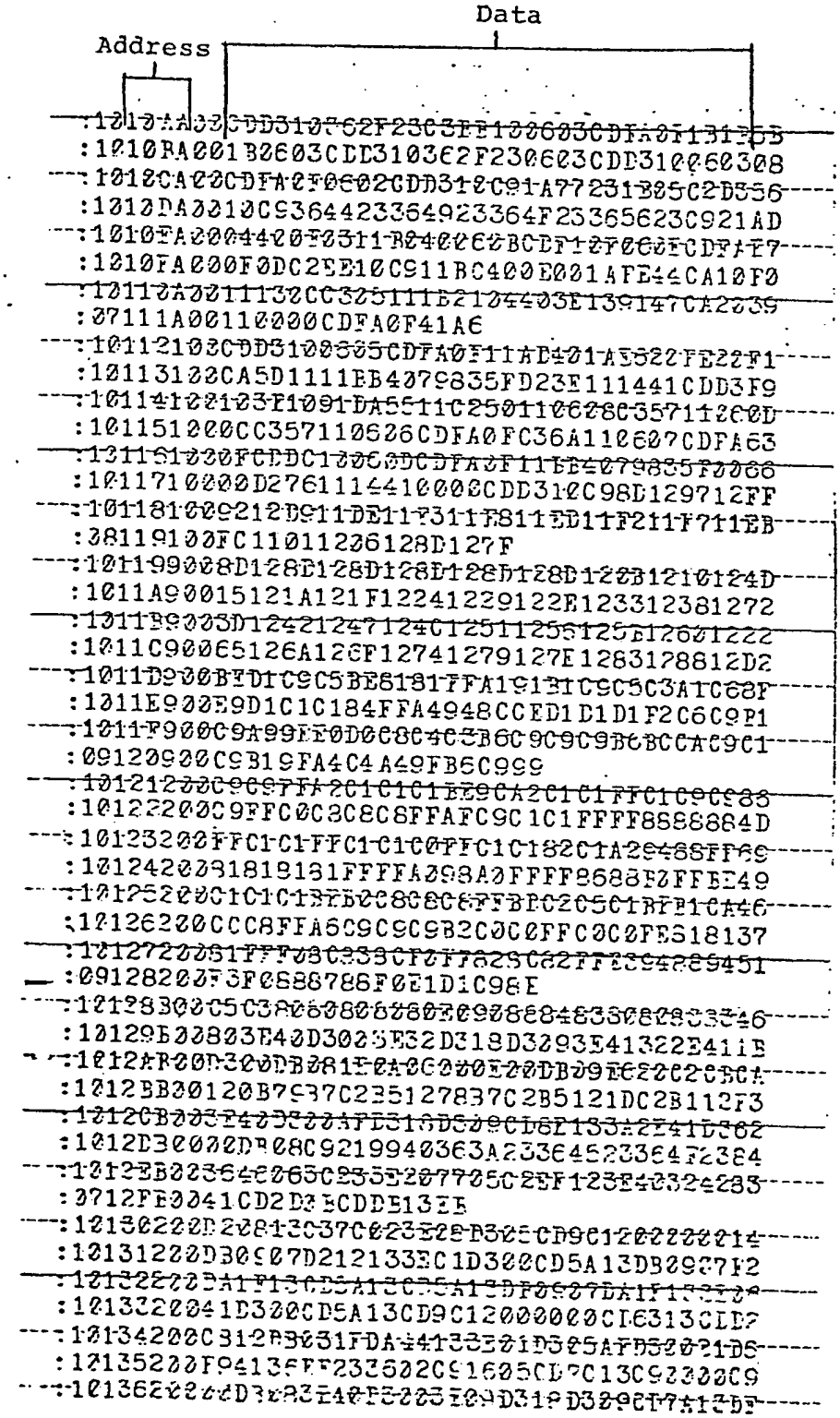
00103



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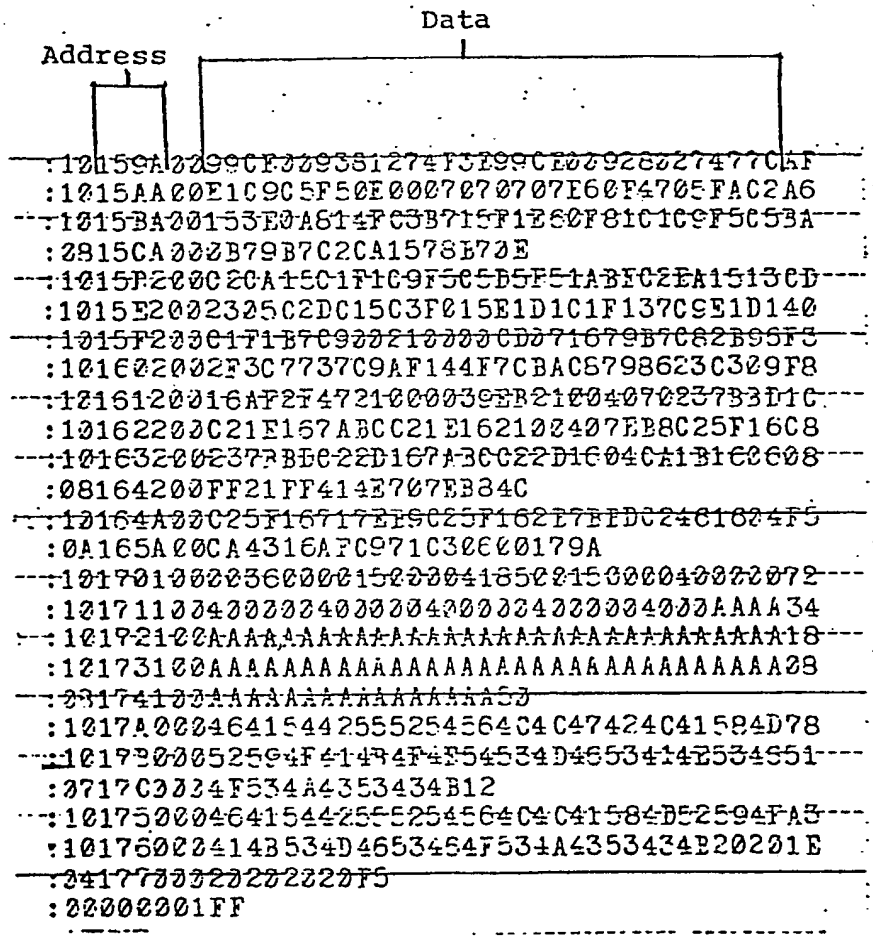


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CLAIMS

1. A system for issuing airline tickets without the intervention of any ticket agent, said system being comprised of a plurality of electro-mechanical ticket terminals, wherein each of said ticket terminals includes:

credit card reader means for reading data from a magnetic strip on a ticket purchaser's credit card as the card is slid by said purchaser through said reader means;

modem means for transmitting signals identifying said credit card to a central computer for a credit check and for receiving signals from said central computer indicating good credit or bad credit;

destination selection means for enabling a person to manually select a destination and

vending means for printing and dispensing a ticket to said selected destination conditional on said signals received from said central computer indicating good credit.

2. A system according to Claim 1 wherein each of said ticket terminals further includes microprocessor means for sequentially controlling the operation of said card reader means, said modem means, said destination selection means, and said vending means.

3. A system according to Claim 2 wherein each of said ticket terminals further includes a data bus and an address bus from said micro processor to a plurality of selectively loadable output registers, with said output register connected to respective ones of card reader means, modem means, destination selection means, and vending means for controlling their operation.

4. A system according to Claim 3 wherein said destination selection means further includes means for manually selecting a one way ticket or a round trip ticket.

5. A system according to Claim 3 wherein each of said ticket terminal means further includes visual display means for directing a person desiring a ticket through a sequence of steps to manually select a ticket by means and said destination selection means.

6. A system according to Claim 3 and further including means for recording data representative of each of said ticket dispensing transactions on a magnetic tape cassette.

7. A method of issuing airline tickets without the intervention of any ticket agent, said method including the steps of;

providing an electro-mechanical ticket terminal at a location convenient to potential ticket purchasers;

allowing a purchaser to manually slide his credit card through a hand operated credit card reader on said terminals;

transmitting electronic signals, identifying said credit card, from said terminal to a central computer for a credit check on said card, and receiving electronic signals therefrom indicating good or bad credit;

allowing said purchaser to manually select a destination via destination selection buttons on said terminal; and

electro-mechanically printing and dispensing a ticket at said terminal to said selected destination conditional on said signals received from said central computer indicating good credit.

8. A method according to Claim 7 and further including the step of allowing said purchaser to manually select a round trip or one way ticket via said destination selection buttons.

9. A method according to Claim 7 and further including the step of directing said purchaser with displayed instructions, to perform said manual steps in a predetermined sequence.

10. A method according to Claim 7 and further including the step of recording data representative of each ticket dispensing transaction on a magnetic tape cassette in said ticket terminal.

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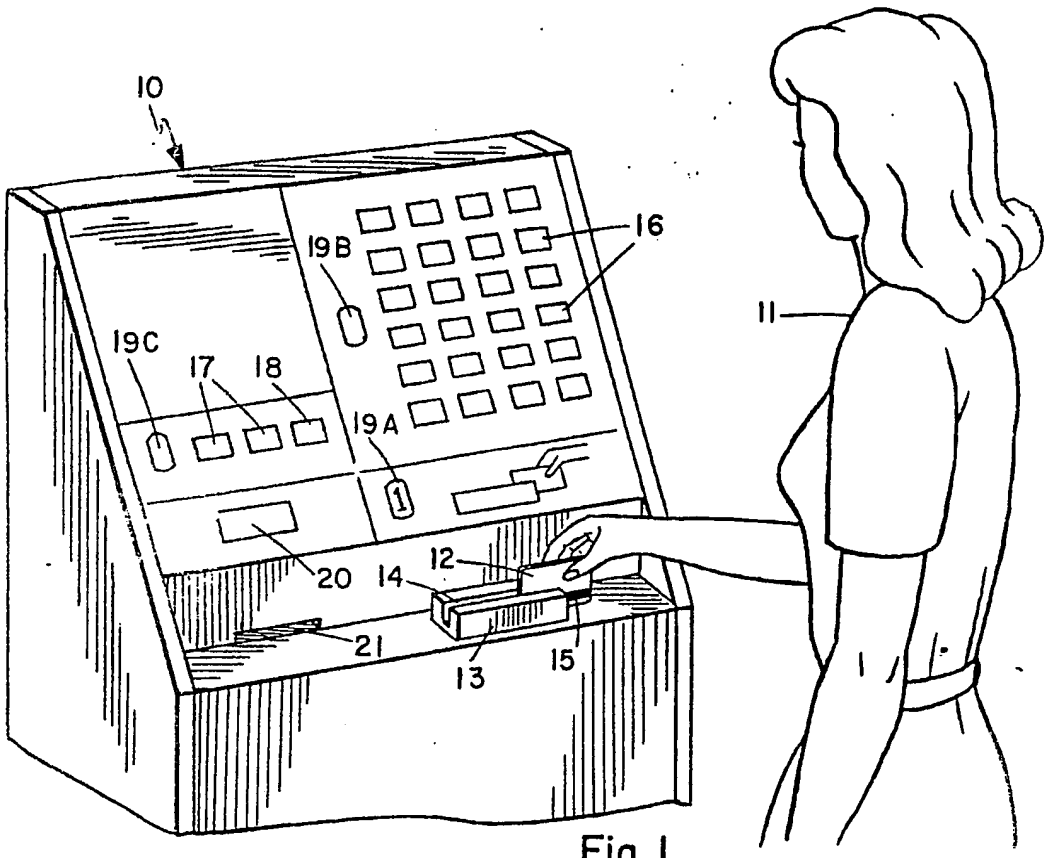


Fig. 1

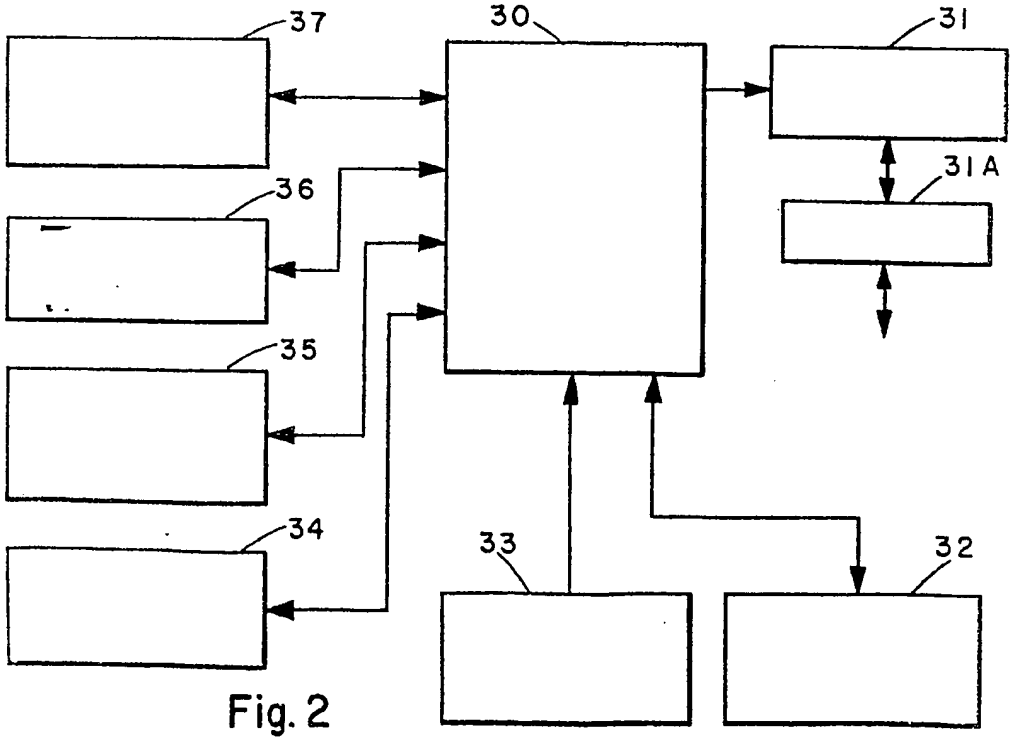
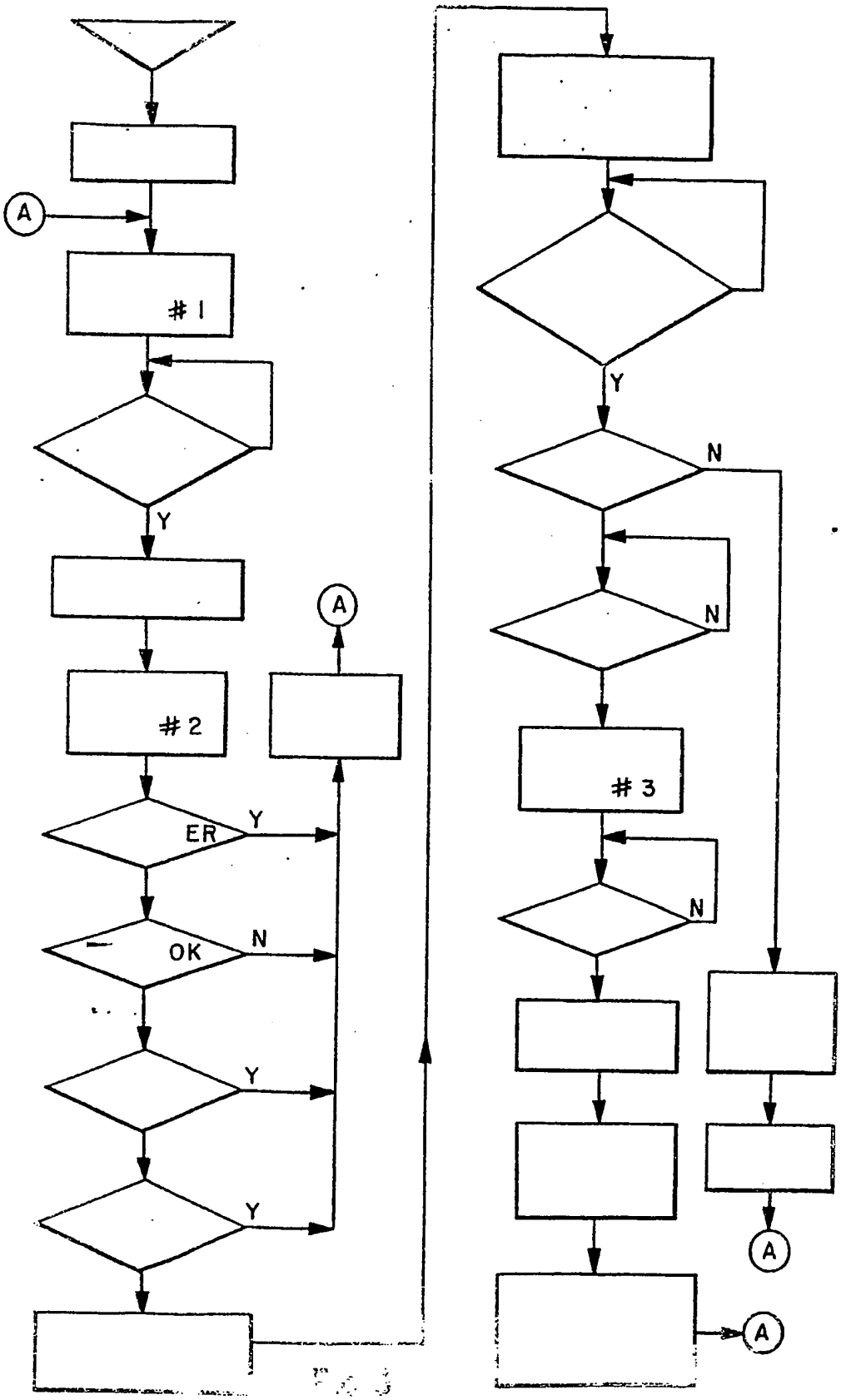


Fig. 2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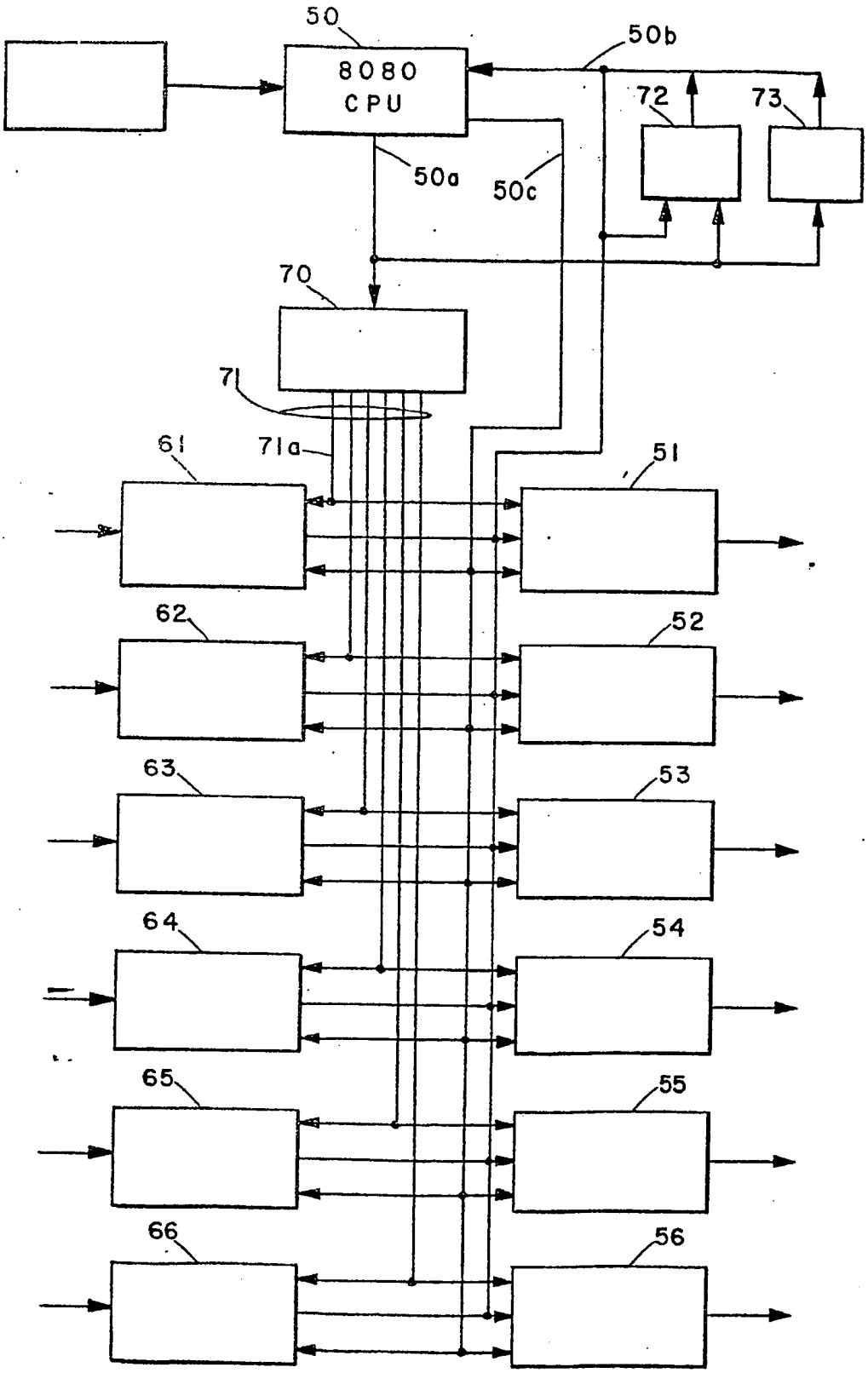
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Fig. 4

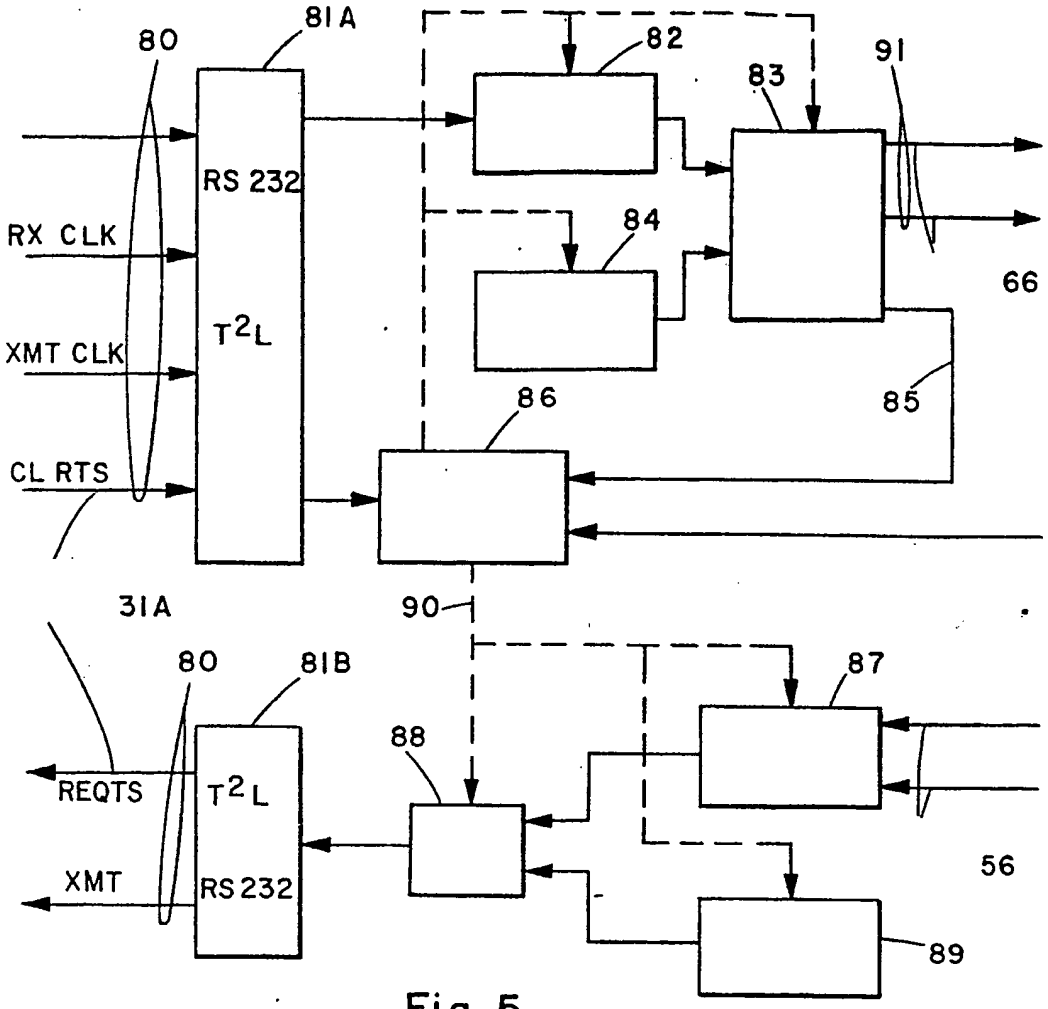
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Fig. 5

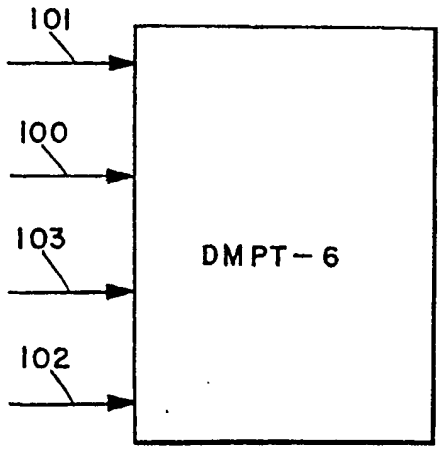
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Fig. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application number 0010399

EP 79 30 2154

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
	US - A - 3 445 633 (V.A. RATNER) * Column 2, lines 12-47; figures and claims *	1,6,7, 10	G 07 F 17/42 7/02 15/26
	US - A - 3 958 103 (A. OKA) * Abstract; figures 1,3; column 2, lines 1-47 *	1,4,7, 8	
	ELECTRONICS INTERNATIONAL, vol. 50, no. 8, 14th April 1977, pages 44-46 "Machines to vend airline tickets" * Complete document *	1,5,7, 9	TECHNICAL FIELDS SEARCHED (Int.Cl. ³) G 07 F 7/00 7/02 7/08 7/10 17/42 G 07 B 1/00 1/02 1/04 1/06 5/00 5/04 5/06 5/08 G 06 F 15/26 G 07 F 17/14
	GB - A - 1 371 062 (BELL PUNCH) * Page 6, lines 48-101; figures 2,3,10 *	1-3	
P	FR - A - 2 385 158 (ELECTRONIQUE M. DASSAULT) * Claims and figure *	1,2,5, 7,9	
A	US - A - 3 622 995 (V.C. DILKS) * Abstract; figures *	1	CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
A	US - A - 3 750 103 (D.R. ANGUS) * Abstract; figures *	1,3,7	
	./.		

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21-01-1980	DAVID

EPO Form 1503.1 06.78

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	US - A - 3 212 615 (M.W. HELLAR) * Column 4, lines 57-70; figure *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)